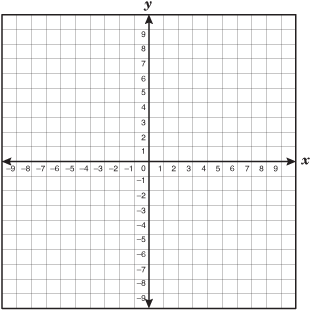
**Unit 2: Analytic Geometry**

**Lesson 1: Midpoint of a Line Segment**

**Cartesian Grid**

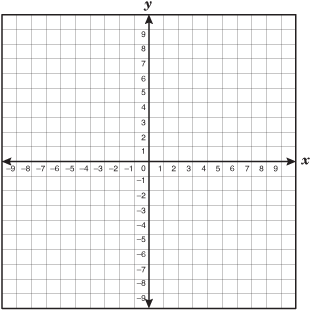
* Grid with perpendicular axis
* X axis runs horizontally
* Y axis runs vertically

1. Plot and Label the line segment defined by each pair of endpoints
   1. P(1, 1) and Q (7, 5)
   2. R (- 5, - 4) and S (- 1, 0)
   3. T (- 3, - 4) and U (6, 1)
   4. V (- 4, 6) and W (3, 4)



Example 1: Find a Midpoint

A city has two hospitals, show on the city map at coordinates A (2, 2) and B (6, 8). The city wants to build a new ambulance station between the two hospitals. Determine the coordinates of this location.

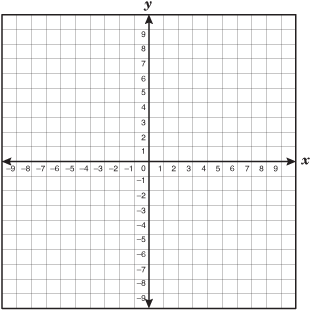


Method 1: Calculate the Rise and Run

Run = x2 – x1 = 6 – 2 = 4  
Rise = y2 – y1 = 8 – 2 = 6  
  
Therefore the coordinates of the midpoint are  
(x, y) = (x1 + run, y1 + rise ) = (2 + 4 ÷ 2, 2 + 6 ÷ 2) = (4, 5)  
 2 2  
Method 2: Use a Formula  
  
(x, y) = ( x1 + x2 , y1 + y2) = ( 2 + 6 ÷ 2, 2 + 8 ÷2) = (4, 5)  
 2 2

Example 2: Median of a Triangle

Determine an equation for the median from vertex C for the triangle with vertices C (5, 2),   
A (- 3, 3) and B (2, -5)



Use the formula from Example 1 to determine the coordinates of this midpoint.

**(x, y) = (x1 + x2 , y1 + y2 ) = ( -3 + 2 ÷ 2, 3 + (- 5) ÷ 2) = ( - ½ , - 1)  
 2 2**

**Slope, m = rise ÷ run = y2 – y1 = 2 – (- 1) = 3 = 3 x 2/11 = 6/11  
 x2 – x1 5 – (- ½) 11/2  
  
y = mx + b  
2 = 6 (5) + b  
 11  
2 = 20 + b  
 11  
22 – 30 = b  
11 11  
- 8 = b  
11**

**Y = 6 x – 8  
 11 11**